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Agricultural Economics RESEARCH

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UNITED STATES DEPARTMENT OF AGRICULTURE

Agricultural Marketing Service

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AGRICULTURAL ECONOMICS RESEARCH

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Number 1

A Study of Livestock Marketing in Iowa

By Emil H. Jebe and Norman V. Strand

An enumerative survey of cattle and hog-marketing practices of Iowa livestock farmers was conducted in March and April 1952 by the Statistical Laboratory of Iowa State College, cooperating with the Iowa Crop and Livestock Reporting Service and the Agricultural Marketing Service. The study was undertaken to learn how and to what extent livestock farmers use information from the monthly marketing intentions survey conducted by the Iowa Crop and Livestock Reporting Service. To get valid data on the subject it was necessary to learn the degree to which farmers modify short-term marketing plans and what media or sources of information affect those plans. The purpose of this paper, the first report of the study to be published, is to present a general introduction to the problem, to explain the sample design and analysis, and to summarize (1) general information collected, (2) some comparisons of respondents and nonrespondents to the mail survey, (3) farmers' use of marketing information, and (4) changes in marketing intentions. In another article, to appear in a later issue of Agricultural Economics Research, it is planned to summarize the information collected in the survey which relates to the farmers' marketing of specific lots of livestock—cattle or hogs, or both—and to describe the sources and uses of market information.

THE IOWA CROP AND LIVESTOCK REPORTING SERVICE conducts in Iowa a monthly mail survey of farmers' marketing intentions for cattle and hogs. This survey is made as of the first of each month. On this questionnaire farmers report their marketing intentions for the current and following months, as well as their livestock sales for the month just past. These reports of individual farmers are used as a basis for the preparation of estimates of cattle and hogs marketed during the last month, the number to be marketed during the current month, and the intended marketings for the month following. Estimates of marketing intentions for the State are released for publication around the 20th of each month.

Releases of results of monthly estimates are made available to radio and press, and are sent to all persons who are reached by the monthly marketing intention inquiry, to regular crop and livestock reporters, and to others whose names are on the general mailing list of the State agricultural statistician. Thus the information regarding intentions to market reaches some farmers indirectly by radio and the newspapers and others directly from the Iowa Crop and Livestock Reporting Service.

The sample used for the monthly mail inquiry consists of a random systematic group of names of farmers drawn from the 1950 records of Iowa county assessors, from which farms reporting no livestock, or only small numbers,

have been eliminated. The mailed inquiry also omits all names that are on any of the regular mailing lists of the State Agricultural Statistician. This is done to minimize the burden on the regular crop reporters.

Purposes of the Study

The general purposes of the study upon which this report is based were (1) to examine the procedures that farmers follow as they prepare to market certain classes of cattle and hogs, (2) to learn where they get information to help them in reaching decisions to market, and (3) to learn what feeding and marketing practices they follow. In other words, the study related to the livestock marketing process at the farm level. This knowledge is needed to evaluate the principal aspects of the problem being studied. These aspects are:

- (1) What proportion of Iowa farmers use the State statistician's release on marketing intentions?
- (2) What are the characteristics of farmers who use the release, and how do they use it?
- (3) On what other sources of marketing information do farmers depend?
- (4) To what extent do farmers' use of intentions estimates result in changes in marketings from previously reported intentions?

The Questionnaire

From a consideration of the problem and the objectives, it seemed that an interview survey of both respondents and nonrespondents to the mail survey should yield some of the desired information. In the process of developing a suitable questionnaire for the field survey these general objectives or purposes were worked out in some detail. The questionnaire demanded more than the usual pretesting of surveys. Four pretests were made of the preliminary schedules. The following summary describes in broad outline the content of the schedule used for the field enumeration:

<i>Section Pages</i>	<i>Subject Matter</i>
Face sheet 1	Identification of selected farm operator.
A 2	Basic information on farm size, tenure status, age, and education of farm operator.
B 2, 3, 4	Cattle and hog numbers 1951.
C 4, 5, 6	Cattle and hog sales since September 1, 1951.

Section Pages

Subject Matter

D 7, 8, 9	Cattle sales—detailed information relating to one selected eligible lot.
E 9, 10, 11	Hog-sales—detailed information relating to one selected eligible lot.
F 11, 12	General Marketing Plans and operations including sales intentions for April 1952.
G 13	Farm Feeding Program
H 14, 15	Sources and use of Marketing Information.
I 16, 17	Iowa Marketing Intentions Survey—specific questions on the mail survey.
J 18, 19	Changes in Marketing Intentions—asked only of cooperators who had reported changes from intentions in their marketings.

An important feature of the schedule was that the list of questions would be so organized that the interviewer could progressively probe further into the interviewee's marketing situation. To illustrate, the following specific questions were asked:

Why did you sell this lot of cattle at that time?

What was it that changed your plans?

When you were ready to sell these cattle how did you find out what price you could get for them?

Do you find out from any sources at all: About hog and cattle prices, or about hog and cattle numbers that may come to market in the next 2 months?

Do you receive any other bulletins or reports that cover hog and cattle marketing?

Do you use the reports from the mail survey?

Four specific questions were asked "matched cooperators" regarding actual reported changes in marketings, or changes in intentions. (A matched cooperator filled out his mail schedules in the two consecutive months, January and February, so that it was possible to detect changes in intentions by inspection of the mail schedules.)

The Survey Plan

Mail schedules on marketing intentions were first sent in October 1951, to farm operators on the random list of names drawn from the records of Iowa county assessors. The list was circularized by mail again on January 1 and February 1, 1952. These operators were receiving the uniform treatment of both mailed schedules and summary reports from the mail re-

turns. As the enumerative survey was begun in March 1952, however, the treatment applied to these farm operators was of rather short duration. This fact is pertinent to evaluation of responses to the questions and their interpretation.

The plan was to study Iowa farm operators who would supply data from which unbiased estimates of State totals or State means and measures of precision could be prepared. Unfortunately, the deletion from the assessors' lists of nonlivestock farmers and those on the regular statistician's mailing lists prevented this and added to the difficulty of making comparisons with Census' and assessor's figures.

It was considered necessary for both cooperators and noncooperators¹ to be interviewed to obtain information relevant to the survey objectives. The types of information to be obtained suggested a differential sampling rate for these two groups, with emphasis on the cooperators. Limitations of funds for the field work further affected the decisions on sampling rates for the two groups.

There was strong interest in obtaining considerable information from cooperators who indicated changes in marketings from their previous intentions as reported on the mail survey. If enough information could be obtained from changers in this group to indicate a trend, the fourth principal aspect of the problem could be studied: To what extent and for what reasons do farmers change from their stated marketing intentions? Selection of a larger sample from this special group, however, would have complicated still further the general estimation problem. Therefore, it was decided to make no special effort to include members of this group in the sample from the available lists, hoping that randomization procedures would include a number of the matched cooperators in the ultimate sample who reported in both January and February on the mailed survey. Actually, 78 matched cooperators were obtained.

Briefly then, the survey plan comprised the sampling of a universe of Iowa livestock farmers represented by an available sublist that had

¹ Cooperator is defined here as a farmer who completed and returned at least one of the inquiries mailed during October, January, and February. Noncooperator is defined as one who did not return any of the inquiries.

received uniform treatment. From this list both cooperators and noncooperators with the State Statistician's mail survey of marketing intentions were to be interviewed to obtain answers to the schedule questions. The easiest way to achieve the sampling of the universe of interest would have been to use simple random sampling from the list until the desired number of names of cooperators and noncooperators had been drawn. Such a procedure would have been preferable from the statistical viewpoint, but economic and practical considerations seemed to weigh against it. At least three callbacks were wanted, which might entail a lot of travel with entirely random choice of the sample points (farms). Some grouping of farms therefore seemed desirable. The list gave county, township, and postal addresses of farm operators. By sending interviewers to county seats with lists of names, it was hoped to locate the approximate residences of farm operators who were chosen for interviews. Thus, grouping of the sample by county was indicated.

With the general structure of the design decided upon, the actual sample selection was carried out as follows:

1. Iowa was divided into 33 strata.
2. Counties formed the primary sampling units within a stratum. Each stratum contained 2, 3, or 4 counties. Insofar as possible, strata were equalized in size in terms of farms on county assessor lists in 1950. With a total of 200,401 such farms, average stratum size was 6,072 farms. Range in size of strata varied from 4,800 to 6,900 farms.
3. In each stratum one primary sampling unit (county) was chosen with probability proportional to farms on assessor lists.
4. Total sample size in terms of the sub-elements, farm operators of "assessor farms," was set at 300. Principally, this figure was dictated by funds available for field work.
5. Of this 300, an arbitrary division of the sample was made into 200 cooperators and 100 noncooperators. This division was based on the decision for a differential sampling rate mentioned above, and not on the relative proportions of cooperators and noncooperators in the list.
6. Allocation of the subsample to the chosen counties was made on the basis of the size of the stratum containing the chosen county. Consider, for example, a stratum containing 6,005 assessor farms. Then $(6,005/200,401) (200) = 6$ cooperators and $(6,005/200,401) (100) = 3$ noncooperators.
7. Simple random sampling of cooperators and noncooperators from the available list (first divided into the two groups) was used in the chosen county to select the farm operators to be interviewed; that is, to select the 6 and 3 operators, respectively, in the example in 6, preceding. One alternate selection in each group was given the enumerator for use in field substitution if the names originally designated could not be interviewed after 3 trials. Road conditions and weather caused earlier substitution in some cases.

A few other numerical facts are presented here to elaborate the figures used above in explaining the sample selection:

Number of assessor farms in "treated" list (after two deletions as reported above) -----	3,371
Number of cooperators in list -----	1,375
Percentage of cooperators -----	40.8%
Number of noncooperators -----	1,996
Percentage of noncooperators -----	59.2%

Field Work

Eight enumerators, all women, were employed on the project. The training of interviewers lasted for 2 days and included procedures for locating residences of farm operators in chosen counties. The principal sources relied upon were county extension directors, PMA personnel, and county plat books. A complete set of interviewer instructions was prepared.

Field work, begun March 10, was to be completed by March 22, but weather and road conditions made it necessary to extend the interviewing period to March 28, and even further clean-up work was necessary.

A final summary of the results of the field work is given in table 1. It includes field and office substitution for filling in missing schedules.

It has been pointed out that the universe sampled in this study is not representative of

all farms in the State, but only of those defined as "livestock" farms which had cattle and hog inventories for 1950. The total number of "livestock farms" in Iowa was not known. It is estimated to be around 185,000, but only about 175,000 are included in the universe. With 200,000 total farms in the State, some 15,000 nonlivestock farms and about 10,000 other farms (mostly livestock farms) on the State Statistician's mailing lists are not included in the universe. Generally, most of the farms excluded would be expected to be smaller than those included. Table 2 sheds some light on this problem.

TABLE 2.—Percentage distribution of farms, by specified acreage classes, Iowa, 1950 and 1952

Class	1950 All farms ¹	1952 Livestock farms ²
<i>Acres</i>	<i>Percent</i>	<i>Percent</i>
Less than 30 -----	9.4	2.8
30- 49 -----	3.6	1.8
50- 99 -----	12.8	6.0
100-139 -----	13.8	14.2
140-179 -----	24.3	29.4
180-259 -----	20.8	24.4
260-499 -----	13.8	16.8
500-999 -----	1.4	3.0
1,000 and over -----	.1	1.6
	100.0	100.0

¹ 1950 U.S. Census.

² Agricultural Marketing Service—Iowa State College Marketing Survey, March 1952, estimates.

TABLE 1.—Summary of field enumeration

Schedules	Coop- erators	Noncoop- erators	Total
	<i>Number</i>	<i>Number</i>	<i>Number</i>
Assigned -----	200	100	300
Completed -----	178	73	251
Not Completed			
Refusals -----	3	8	11
Not at home -----	10	4	14
Not located -----	1	9	10
Quit farming -----	1	3	4
Deceased -----	1	0	1
Bad roads -----	6	3	9
Total not completed	22	27	49
Substitutions			
Field -----	8	11	19
Office -----	14	16	30
Total -----	22	27	49

Agricultural Marketing Service and Iowa State College Livestock Marketing Survey, March 1952.

Farms of less than 100 acres constitute around 25 percent of all farms, according to the 1950 census; but in the survey 11 percent of the farms are less than 100 acres. The census reported an average of 168.7 acres per farm, the survey 199.3. Farms of less than 100 acres according to the 1950 census include proportionally fewer farms with livestock than do those of more than 100 acres. Other tabulations made but not reported here indicate that relatively fewer livestock farms are in the smaller acreage classes. Furthermore, it is known that the Iowa State Farm Census includes fewer small farms than the 1950 United States census enumerates. Thus, the acreage differences observed do not seem unreasonable.

Estimation

For certain items estimated from the survey considerable effort was devoted to estimation and the preparation of measures of precision. Some items could be estimated with reasonable precision, say with relative sampling errors of 5 to 10 percent. Examples of such items were "farm acres" and "cattle or hogs on hand." But such items as hog or cattle sales planned for April 1952 exhibited large relative sampling errors, as much as 15 to 25 percent, or more.² Of course a total sample of 300 farms is small for making State estimates of some agricultural items that are inherently rather variable in Iowa.

Several estimators were considered for preparing the estimates given in table 3 and succeeding tables. An estimator that utilized the differential selection probabilities and the best information available on proportions of cooperators and noncooperators in each stratum yielded results that differed little from a simpler estimator based on the statewide proportions of the two groups in the universe. The simpler estimator was therefore employed. Let \bar{y}_C and \bar{y}_{NC} be the respective means or proportions calculated for the cooperator and noncooperator samples. Note that the usual binomial coding of 1 and 0 for "yes" and "no" answers changes these means to proportions. Above were listed $p = 0.408$ and $q = 0.592$ as the statewide proportions of cooperators and noncooperators with the mail survey. Thus, an estimated mean or proportion, $y = p \bar{y}_C + q \bar{y}_{NC}$. A reasonably accurate approximate procedure for combining the two sample proportions is

$$y = \frac{1}{10} (4 y_C + 6 y_{NC}).$$

Some differences in characteristics were found between the 200 cooperators and the 100 noncooperators in the sample survey (table 3). But in many respects, the characteristics of cooperators and noncooperators were remarkably similar. Livestock numbers were somewhat greater on farms of cooperators, cooperators took more magazines than noncooperators, and a larger proportion of cooperators sought out

² In the preparation of these estimates the "collapsed strata" technique described by R. Goodman was used. Amer. Statistician 2(4): 22. 1948.

TABLE 3.—Averages and percentages for selected characteristics by cooperator and noncooperator

	Cooperator	Noncooperator	Combined Estimates
Acreage per farm-----	<i>Acres</i> 200.2	<i>Acres</i> 198.7	<i>Acres</i> 199.3
Owners -----	<i>Percent</i> 48.0	<i>Percent</i> 50.0	<i>Percent</i> 49.2
Years a farmer-----	<i>Number</i> 20.8	<i>Number</i> 20.4	<i>Number</i> 20.6
Years on this farm ----	13.3	12.4	12.8
Age, years -----	46.2	45.9	46.0
School years completed--	9.6	9.4	9.5
Livestock			
On farms			
1951			
Cattle -----	44.8	36.9	40.1
Hogs -----	152.9	149.6	150.9
1952, March 15			
Cattle -----	34.7	34.0	34.3
Hogs -----	64.2	56.7	59.7
Sold per farm, Sept. 1, 1951-Mar. 1952			
Lots			
Cattle -----	1.53	1.14	1.30
Hogs -----	2.785	2.58	2.66
Animals			
Cattle -----	9.82	5.85	7.44
Hogs -----	74.7	78.0	76.68
Percentage of farmers	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Receiving news- papers, magazines and reports			
5 or less-----	40.5	49.0	45.6
6-14 -----	59.5	51.0	54.4
Who listen to radio reports on daily markets -----	100.0	98.0	98.8
Who find out about number of cattle and hogs which may come to market in the next 2 months	66.2	52.5	58.0
Who say they receive the marketing in- tentions release ---	89.5	62.0	73.0

Agricultural Marketing Service and Iowa State College Livestock Marketing Survey, March 1952.

information about possible future market receipts.

There was a high negative response to the question, "Do you receive the monthly report on intentions to market hogs and cattle issued by the Iowa Crop and Livestock Reporting Service?" Hence, farmers answering "no" were shown a recent copy of the release and again asked if they received reports of this type. This reduced the percentage of negative responses from 46 to 27 (table 4). Some proportion of this 27 percent probably actually had not been

reached by the mailed release, so that their negative answers cannot be attributed to lack of attention to mail or lack of interest in the material.

There had been no special promotional efforts to make the public aware of this new source of marketing information. It was a new project and not more than three copies of the release could have been received by farmers by the time they were interviewed. Both before and after being shown a copy, noncooperators were con-

siderably less aware of receipt of the release than were cooperators. These results were to be expected, as the cooperators had filled out at least one schedule (in October, January, or February) that had been used as a basis for the releases. Although the estimated proportions are subject to considerable sampling error, especially for the noncooperators, it is a rather striking fact that almost 40 percent of this group in the sample either did not receive the release or were not aware of receipt of it.

TABLE 4.—*Number and percentage distribution of survey respondents answering the question—Do you receive Iowa Marketing Intentions Report?*

Item	Cooperators		Noncooperators		Combined
	Reporting	Percentage distribution	Reporting	Percentage distribution	
	Number	Percent	Number	Percent	Percent
Respondent answering the question—					
Yes	149	74.5	40	40.0	54.1
No	51	25.5	60	60.0	45.9
Total	200	100.0	100	100.0	100.0
After report was shown					
Additional "Yes"	30		22		
Total					
Yes	179	89.5	62	62.0	73.2
No	21	10.5	38	38.0	26.8

Agricultural Marketing Service and Iowa State College. Livestock Marketing Survey, March 1952.

TABLE 5.—*Number and percentage distribution of survey respondents answering the question, "Do you use these Iowa Marketing Intentions Reports?"*

Item	Cooperators			Noncooperators			Percentage distribution of combined estimates	
	Reporting	Percentage distribution		Reporting	Percentage distribution			
		Receiving report	In sample		Receiving report	In sample	Receiving report	In sample
	<i>Number</i>	<i>Percent</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Farmers								
Receiving report								
Using -----	65	36.3	32.5	15	24.2	15.0	29.0	22.0
Not using -----	114	63.7	57.0	47	75.8	47.0	71.0	51.0
Total -----	179	100.0		62	100.0		100.0	
Not receiving report -----	21		10.5	38		38.0		27.0
In sample -----	200			100				

Agricultural Marketing Service and Iowa State College. Livestock Marketing Survey, March 1952.

The nonuse response of 51.0 percent (table 5) may seem rather high. This reflects the fact that many farmers normally do not try to find out about numbers of livestock that may come to market in the near future. Other reasons are that these operators may have marketed few animals during this period. They might be dairy or cash-grain farmers to whom information of this kind would not be of great interest.

Use of the report was indicated by 22 percent of all farmers (combining cooperators and non-cooperators), and by 29 percent of those who admitted receiving the report (table 5). Since some who said they did not receive it probably were not reached by it, and might have used it had they received it, these percentages may be taken as minimum and maximum estimates of use. That is, if the report had been mailed to, and received by, all livestock farmers in the State, the estimate of use would be somewhere between 22 and 29 percent.

In view of the short time the release had been available this percentage is surprisingly high. Furthermore, some of the reasons given in table 6 for not using the report would indicate that if the report had been available longer more might have used it. In particular, those who said the report had not been available long enough and those who said they had had nothing to market since receiving the release might have used it in their marketing plans. On the basis of this survey, however, no estimate can be made of how much the use would have increased.

Table 6 contains the responses given to the questions, "How do you use the figures on livestock marketing intentions?" and "Why don't you use these figures to help you in deciding when to market your cattle and hogs?"

Table 6 shows only the numbers classified in these categories for the sample operators reporting receipt of the release. Percentages were not calculated as many would be based on small numbers; for the same reason combined percentages are not given. Several farmers who use the releases—5 noncooperators and 19 cooperators—emphasized in addition the short time they had been available. Reliability of the releases was questioned by a considerable number of farmers.

TABLE 6.—*Classification of responses to questions on why mail survey releases on marketing intentions are used, or are not used*

Item	Co-operators	Non-co-operators
	Number	Number
How releases are used:		
Information related to prices	3	0
Only when ready to market	1	3
Reads	4	0
Studies	3	0
Use, but have had them too short a time	19	5
Give information on runs	2	2
Helps determine on sales, etc. ¹	22	2
Miscellaneous	1	1
Irrelevant responses	9	1
Total	64	14
Why releases not used:		
Have had nothing to market	8	5
Sells when livestock are ready	38	11
Relies on own judgment	5	1
Reports not available long enough	15	3
Relies on other sources	6	3
Pays no attention	8	2
Use occasionally when something to sell	1	1
Questions accuracy of report	21	9
Miscellaneous	6	5
Answers irrelevant	5	5
Total	113	45

¹ Other responses in this category are "Can figure on the trend," "Watch for numbers coming in," and "Might ship a little sooner."

Agricultural Marketing Service and Iowa State College. Livestock Marketing Survey, March 1952.

Changes in Marketing Intentions

The analysis of individual changes in marketing intentions from those reported on the mail questionnaires is of primary interest. This analysis is useful in illustrating one of the problems associated with the preparation of reliable estimates of intended marketings from the mail survey.

It is noted that farmers reported each month by mail in response to the simple questions, "How many hogs (or cattle) do you intend to market in (month)?" For the last section of the interview schedule a special set of questions was constructed to check on these reported marketing intentions for January and February 1952. From the sample of 200 cooperators

TABLE 7.—Number of farmers reporting and changes from intentions to market livestock in January and February, 1952

Item	Cattle		Hogs	
	Farms	Head	Farms	Head
	Number	Number	Number	Number
Changes from intentions to market				
January 1952 ¹				
No marketing done or no change reported	39		17	
Marketed more than intended	3	8	12	145
Marketed less than intended	8	-25	21	-379
Total	50	-17	50	-234
February 1952 ²				
No intentions to market or no change	32		14	
Larger than January reply	11	26	19	327
Smaller than January reply	7	-21	17	-392
Total	50	5	50	- 65

¹ As indicated by actual marketings reported on February mail reply.

² As indicated by change of February mail reply from January reply.

Agricultural Marketing Service and Iowa State College. Livestock Marketing Survey, March 1952.

schedules were matched with all those who reported on the mailed inquiry for both January and February 1952. In the group of 200 there were 50 who had indicated some change on their February report from their January report. The changes that these 50 farmers indicated in their February report were copied into certain blanks in questions on the enumerative survey schedule. The four questions for checking on these indicated changes were:

"On the first of January you reported that you were planning to market ----- cattle (or hogs) in January, but on the first of February you reported the marketing of ----- head of cattle (or hogs) in January. How did you happen to change your plans in this way in marketing your cattle (or hogs)?" This question was an attempt to check *actual* marketings against reported intended marketings.

"Next, on January 1 you reported that you expected to market ----- head of cattle (or hogs) in February, but on February 1, you changed this to a report of expecting to market ----- head in February. What brought about this change in your marketing plans from January 1 to February 1 for your cattle (or hogs) marketing for the month of February?" With this question an attempt was made to

check on the changes in intentions from a month ahead, to the beginning of the month in which intended marketings were to be made. Naturally, not all of the 50 matched cooperators indicated changes on their mail responses that would fill the blanks on all four of the questions. Hence, mostly smaller numbers are reported in table 7.

On the whole, what can be said about these data? First, there was no information about the actions of noncooperators with the mail survey. The tentative assumption might be made that their actions are essentially random, hence do not affect the estimation of the intentions problem. As they comprise the larger group, about 60 percent of the population, this may be a hazardous assumption. Using the group of 50, it is an approximate minimum estimate that 25 percent of the cooperators indicated some kind of change in cattle or hog marketing intentions for the 2-month period. Obviously, this is a minimum, as schedules could not be matched for a large part of the chosen sample of 200 cooperators.³

³ These 200 were classified as follows:

0—replied only in October	22
1—replied in January or February	100
2—replied in both January and February	78

What about the net effect of these changes? For cattle, both the January and February changes, -17 and +5 appear too small to indicate a real change or to affect an estimate. Yet, -17

— weighted by 0.408 and expanded to the 200

population total yields as a minimum⁴ minus 6,000 or 7,000 head. For hogs, the story is different, at least in terms of number of head looking at the -234 and -65 figures, respectively, for the 2 months. The -234 when expanded, yields an approximate minimum⁵ of about minus 80,000 or 90,000 head. These are not negligible quantities. However, the precision of such estimated changes is rather low. The data were for only 2 months in a year. Definitive comment on the problem must await availability of additional data.

Also classified into categories were the reasons that these farmers associated with their changes from previous intentions. Numbers of farms for each of these categories were too

⁴ Minimum in the sense used here must be taken in absolute-value terms.

⁵ See footnote 4.

small to list in detail here. Some of the reasons reported were market conditions, feed situation, breeding results, disease, transportation space, and hogs ready sooner or later than expected. A few indicated change of mind or error in reporting.

Summary

The survey indicates that a minimum of about 22 percent of Iowa livestock farmers would have made some use of the mail survey releases during the period covered by the investigation if mailings had been sent to all farmers in the universe. Of farmers who were aware of receipt of the release, 29 percent indicated some use of the reports. As these releases had been available to the interview group for only a short time, this use is rather large. Details on this use will be given in another paper. It seems that the changes in marketing intentions are too large to be considered negligible, but further study is needed in this area. The survey also revealed some differences between cooperators and noncooperators with a mail survey even though the selectivity differential did not have a long time to develop.

Problems in the Analysis of Food Consumption

By Marguerite C. Burk

The choice among several concepts of food consumption depends upon what is to be studied, whether a farm problem, a marketing problem, or a problem at the level of consumer purchase or food intake. That choice will largely determine the selection among possible measures of food consumption. No single measure of changes in food consumption can be designed to meet every need. In this paper, the meanings of food consumption that are set forth, together with their related measures, are those involved in questions frequently raised by Government analysts and information specialists, by nutritionists, farm organizations, advertising agencies, and journalists, and by businessmen in the food industries, and other interested individuals. As the author indicates, the intrinsic differences among the several meanings of food consumption are so significant that they materially affect the conclusions drawn from the analysis of specific problems.

A REVIEW OF WHAT WE CAN MEAN by food consumption and by changes in consumption shall be our first task. In this we shall limit our consideration to changes in food consumption per capita—total consumption or disappearance of food divided by the population—as opposed to total consumption in the United States. We shall consider only civilian consumption and annual averages. And we shall not go into the problem of errors in the measurement of food consumption. These limitations will enable us to avoid certain byways and much confusion, and they will not interfere with exploration of conceptual problems.

Quantity is the first meaning of food consumption that comes to mind. According to the dictionary the meaning of the term, "quantity," can be broadened to include value or expenditure, yet in referring to food it is usually restricted to weight or volume. In fact, people generally mean total poundage when they speak of total quantity of food consumed. Looking first at the problem of total poundage of all foods combined, we must distinguish among the poundages of food commodities in the forms in which they leave the farm gate, the processor, and the wholesale produce dealer, and as they are purchased at retail. Table 1 contains estimates of such poundages for 1939 and 1952.

Farm weights are usually in terms of the fresh or raw products. Because the inedible portion of meat animals is so great, farm weights of animals are rarely used in measur-

ing food consumption, although logically they should be. For example, the farm weight of a steer may be 1,000 pounds, including bones, blood, and hide; the wholesale distribution or carcass weight would be about 550 pounds; and the quantity of meat sold at retail would be about 470 pounds.

For commodities that are mostly edible, such as fruits and vegetables, we often use fresh equivalents of processed items and describe them as farm weights. If precision is not required, such data are generally not difficult to estimate because reasonably adequate conversion factors have been obtained, largely from trade sources. No doubt processing yields from raw farm products vary slightly from year to year. But, for lack of information, most of the factors are held constant until changes become sharply apparent.

Each issue of the National Food Situation carries a table containing primary distribution weights of per capita consumption of major foods. This classification includes farm or fresh weights of fruits and vegetables, carcass weights of meats, eviscerated weights of poultry, and processed weights of dairy products and margarine, fruits and vegetables, flour, and refined sugar. Accordingly, it is a mixture of farm weights and processed weights, but it represents the weights of the products at the several points in the process of distribution at which their disappearance or consumption is measured.

TABLE 1.—*Selected measures of per capita consumption of all foods combined, 1939 and 1952, with percentage comparisons*¹

Concept used	Unit	1939	1952	1952 as percentage of 1939
				<i>Percent</i>
A. Quantity in terms of pounds				
1. Farm products ² -----	Pound-----	3,334	3,272	98
2. Primary distribution weights				
a. Including processed items on fresh weight basis ³ -----	Pound-----	2,114	1,962	93
b. Processed plus farm weight of fresh items ⁴ -----	Pound-----	1,622	1,587	98
3. Retail weight equivalent ⁵ -----	Pound-----	1,547	1,519	98
B. Quantities times fixed prices				
1. At farm level—Index of per capita food utilization, using 1947-49 farm prices ⁶ -----	1947-49=100---	93	100	108
2. At retail level—Index of per capita food consumption, using 1947-49 retail prices-----	1947-49=100---	94	101	107
C. Quantities times changing prices				
1. At farm level but including imported foods and fishery products ⁷ -----	Dollar-----	53	165	311
2. At retail level—all products priced at retail store prices ⁸ -----	Dollar-----	136	368	271
D. Market value of food consumed ⁸ -----	Dollar-----	126	366	290

¹ Fishery products are not included in A or in B 1.

² Meat and poultry, live weight basis; dairy products, whole milk equivalent; fats and oils, in terms of raw materials; farm weight of fruits and vegetables; sugar in terms of sugar beets and sugarcane; cereal products in terms of whole grain; includes coffee beans, tea, and cocoa beans on imported basis. Data prepared for these years only.

³ Differs from farm weight in that meat is on carcass weight basis; poultry, dressed weight; fats and oils in terms of products; sugar in terms of raw sugar; grain products as actual weight.

⁴ Differs from A 2 a in that this category includes processed fruits, vegetables, dairy products, and sugar in terms of manufactured products.

⁵ Approximate weight of all food items (except fish) as purchased in retail stores.

⁶ Derived from civilian food aggregates of index of supply-utilization of agricultural food products.

⁷ Preliminary estimates, include farm value of farm food products sold for domestic civilian consumption, farm home consumption, import values of imported foods, and total payments to fishermen for edible fishery products. Data available for these years only.

⁸ Based on estimates described in *Distribution of the Food Supply of the United States*, this journal, July 1952, with extrapolation to 1952, using quantity, price, and sales data.

In total weight at the retail level we may include processed weights of many foods, plus the trimmed weights of such commodities as meats, fruits, and vegetables.

The variety of weights that can be used for major food items points up the necessity for predetermining the level at which we want total poundage to be measured. It also casts much doubt upon the usefulness of any figure for total poundage of all foods consumed. Nearly always, careful consideration of the specific problem at hand leads to the use of some measure of overall food consumption other than total poundage. Our foods are too heterogeneous in their physi-

cal characteristics for any one physical measure to be satisfactory for analytical purposes. But with groups of foods that are relatively homogeneous, physical weight is a useful concept.

Consider next some of the problems involved in determining the quantity of a group of related foods consumed, such as dairy products. Some are joint products like butter and skim milk that cannot be converted separately to fresh milk equivalents without duplication. One possibility is to convert them back to whole milk equivalents on the basis of the proportion of all milk solids in the processed product compared with whole milk. But nutritionists are

particularly interested in the mineral and protein content of dairy products, so they often derive composite totals of consumption by using the ratio of these nutrients contained in each product to the content of whole milk, rather than total milk solids or butterfat (A 5, table 2).

If we want to know the total poundage of citrus products consumed, we must decide whether to add the extra water that will put concentrated fruit juices on the basis of the usual form of consumption, single-strength basis, or to include them on product-weight basis. For that matter, do we really want the water content of all foods to be counted in "natural state," or as processed? Or do we really want solids only?

Changes in food consumption in terms of these relatively quantitative meanings can be readily measured for some food groups, but not for others, as we shall presently demonstrate. The principal requisite for each comparison is a clear understanding of what is being measured, and why.

Quality Aspect of Consumption

A second and related concept of food consumption combines considerations of *quality* with those of quantity. This applies particularly when we assess changes in food consumption. To many people, an increase of 10 pounds in consumption of steak probably means a greater increase in food consumption than an increase of 10 pounds of hamburger or, perhaps, 10 pounds of potatoes. Applicable here is the following definition of quality, which was developed a few years ago by a group of food technologists, economists, statisticians, and home economists. "Quality is the combination of attributes of a product that have significance in determining the degree of acceptability of the product to a user"¹. It is difficult to evaluate quality, for it may mean food with less waste, or food that is more mature, or more tender, or more costly to produce or to market or to buy,

or food that contains more of particularly needed nutrients. Does a shift from canned to frozen vegetables, or from potatoes to leafy, green, and yellow vegetables represent an increase in food consumption? Most people would agree that it does because a shift in consumption to a line that is higher priced and that usually requires more production and marketing services is generally regarded as an improvement in the quality of food consumed and, for certain analyses, as an increase in food consumption.

An important aspect of the quality of food is its nutritive value. From the standpoint of improving the general level of nutrition of our population, an increase in consumption of foods that supply significant quantities of nutrients which are relatively less plentiful in our diets, even at the expense of reduced consumption of foods high in more plentiful nutrients, represents a desirable increase in food consumption. Because obesity is currently recognized as one of the major problems of nutrition in this country, obviously some substitution of foods high in protein, minerals, and vitamins for foods high in carbohydrate and fat content is preferable to net increases in total quantity of food consumed. Accordingly, many nutritionists would view such shifts as improvements in food consumption. Although the Bureau of Human Nutrition and Home Economics regularly calculates the nutritive value of the per capita food supply in terms of 11 nutrients, as yet there is no satisfactory method for combining the various nutrients into an overall nutritional index.

Consumption in Terms of Value

By food consumption, people often mean the *value* of food, or they may mean what they spend for it. This is the type of concept commonly used by economists who are interested in both quantity and price aspects of the demand for food. But the introduction of value and price leads to complications. The food consumed per capita may be valued at the farm level (\$53 in 1939), the quantity of all food consumed may be multiplied by retail store prices (\$136 in 1939), or the money that consumers spend

¹ United States Department of Agriculture, Agricultural Research Administration. MARKET DEMAND AND PRODUCT QUALITY. A report of the Marketing Research Workshop, July 13-21, 1951 at Michigan State College. Report of Work Group III, Quality, Its Measurement and Application, 188 pp. 1951. (Processed.)

for supplemental marketing services with food may be included (\$126 in 1939), (table 1).

Actually, all of these concepts are useful, each for a specific purpose.

Let us consider, for example, a hypothetical increase of 11 pounds (or 5 quarts) per capita in consumption of fluid whole milk concurrently with a 5-pound decrease in consumption of evaporated milk. No change has occurred in terms of fat solids. Farmers who sell milk for fluid consumption would regard this shift as an increase in milk consumption (farm value increasing 53 cents per capita in 1947-49 prices). But farmers who sell milk to processors would view it as a decrease (farm value decreasing 36 cents at 1947-49 prices). It would represent an increase in consumption of dairy products from the standpoint of retailers or of consumers' milk bills, because the retail cost of 11 pounds of fluid milk (\$1.02 at 1947-49 retail prices) exceeds the retail cost of 5 pounds of evaporated milk (64 cents). For analysis of farm income and of marketing costs, it is well to know that consumers would have paid 38 cents more to have their milk in fresh fluid form, of which 17 cents would go to farmers for extra costs of producing for the fresh market. The total cost of marketing 5 quarts of fluid milk in 1947-49 exceeded by 21 cents the cost of processing and marketing 5 pounds of evaporated milk.

Another example may be suggested by asking, Does the increased outlay for premixes to be made into cakes or cookies indicate an increase in consumption if a concurrent and equal reduction occurs in poundage of flour, sugar, and other ingredients bought by consumers as such? Or if such purchases result in a corresponding reduction in purchases of commercially baked cakes and cookies?

The foregoing review leads to the conclusion that the major problem in measuring changes in food consumption is to decide which precise meaning of consumption is pertinent to the question at hand. After the decision is reached, the choice among statistical data is fairly easy to make.

To demonstrate the significance of carefully matching the conception of food consumption to the particular problem being studied, we

shall take up several questions the analysis of which requires measurement of changes in food consumption.

Problems Related to All Foods

In a study of the demand for farm food products, we usually want to examine the effects of certain economic factors on takings of farm food products. For this purpose, a total poundage of cattle, vegetables, sugar beets, and other products is a nonsensical conglomeration. A total value figure of some kind would have much more meaning. Cash receipts by farmers can often be used, but price changes confuse the analysis of some questions. To avoid such confusion, we can use a price-weighted index of changes in quantities taken, such as the new index of supply-utilization of agricultural products with food uses (changing quantities times average farm prices in base period). This index was designed to measure the annual flow of farm products to food and nonfood uses, to civilians, to our Armed Forces, and to foreign countries. The aggregates for certain categories, such as domestic food and nonfood use, can be readily made into indexes to study major segments of the demand for farm products.

For the study of the demand for farm products arising from civilian food needs, we can use the index of per capita food utilization which was constructed from the percentage of total utilization allocated to the civilian food category.² This index does not measure precisely the quantities from each year's production taken in that year for civilian food use, because of changes in stocks and of problems involved in tracing raw products through processing plants to civilian purchasers. For example, civilian takings of processed vegetables in 1952 included some vegetables grown in 1951. Actual takings of processed items in the year, no matter when produced, were converted to farm-weight equivalents and added to total quantities of vegetables sold on the fresh market and produced in home gardens.

² The details of the construction of this index are given in United States Department of Agriculture, Agr. Handbook 62, CONSUMPTION OF FOOD IN THE UNITED STATES, 1909-52, pp. 2 to 28.

For most analyses, such complications are probably insignificant in the total picture. It is much more important to realize that this index does not measure purely quantitative changes, but also reflects the shifts in takings from lower to higher cost farm products, as from potatoes to other vegetables which require more farm resources. But we usually want to include the effects of such shifts, for our analysis of demand for farm food output is essentially a study of the demand for farm resources of several kinds, which can be combined only on the basis of price. So a value concept is preferable to a simple measure of avoirdupois weight.

With respect to the new index of per capita food utilization, it should be noted how close the figures are to the index of per capita food consumption. The latter index includes the effects of changes in demand for several marketing services, but apparently they have been offsetting, as indicated by the analyses of changes in commodity groups.

For study of changes in value of all productive resources demanded as opposed to costs of marketing, we must consider changing farm values of farm food products consumed (including farm home consumption) plus the import cost of imported foods, plus payments to fishermen for edible products. Figures to match this concept are given in C 1, table 1.

If the problem is to measure the flow of food to consumers at the retail level, we must decide whether we want a total poundage figure composed of meats, fruit juices, fluid milk, processed vegetables, and so on, or a price-weighted figure. The poundage figure is useful only if our interest is in sheer weight of foods handled, although it rarely is.

For economic analysis, a retail-price-weighted total is far more meaningful. At this point, we must remember that retail prices reflect marketing and processing costs as well as farm costs. Even if we use retail prices in a selected base period to derive value aggregates for all years, the value aggregates will be affected by shifts in consumption from fresh to processed items as well as by changes in the poundage of each product consumed. To some extent the shift from fresh to processed items represents a change in quality, if quality is defined as de-

scribed above, and therefore it may be construed as a change in food consumption. This complication precludes the development of a satisfactory measure of quantity alone for all foods together. For many purposes we really want quantity and quality of food to be combined as they are in the usual index of per capita food consumption. Such an index supplies a controlled measure of the changes in consumption of agricultural resources in the form of food and in the purchases of marketing services of particular types.

If changing quantities are multiplied by changing prices at retail, we obtain equivalent *retail values* of food consumed which are useful for comparisons with income and expenditure data in current dollars. An equivalent of this measure has been constructed for food products produced on farms in the United States by adjusting their farm value by the farm-to-retail price spread derived from market basket data. This series is described as the retail cost of farm food products sold to civilians.³ It can also be derived from data on food sales and use by applying markups and margins to convert sales through nonretail channels to approximate retail values. (The data for C 2, table 1 were estimated thus.) Because no data on food expenditures by food groups are reported or can be estimated directly from available information, it is necessary to build up estimates from information concerning price and quantity. The limitations of this technique are readily apparent and have been discussed elsewhere.⁴

But the use of a retail value concept does not provide for changes in some marketing services, such as a shift from home production and consumption to purchases from retail stores. To cover all marketing services we need a *market value concept*, pricing the flow of food into civilian consumption through all channels, not just at retail store prices. In effect, food expenditures meet such a need, but they include price changes for each channel of distribution. As yet no index of all marketing services plus food as produced, in constant dollars, has been

³ Ibid., pp. 132-151.

⁴ Ibid., p. 175.

devised. But such an index probably will be constructed as soon as we develop reasonably adequate measures of the flow of food through channels other than retail stores, and assemble data on prices paid for food sold by such agencies.

Perhaps we really need here an index of marketing services, but there seems to be no way of combining the services of processors with those of warehousemen, retailers, and other handlers except on a value basis. Changing prices for such services complicate any analysis, so we need a deflator. Because a deflator requires pricing of fixed amounts of services, we seem to be in a circle. In time, as we find out more about marketing services, some relatively satisfactory measures probably will be developed. Certainly as consumers buy more and more marketing services with their food and as investment of resources in marketing facilities grows, we shall have greater need for measuring tools. There seems to be no doubt that a quantitative measure of the good or service purchased is essential for demand analysis.

Another popular use (or misuse) of overall consumption data is in the study of the requirements for transportation facilities for food. Even here, the poundage of all foods combined is misleading because of differences in volume and in special facilities or handling required, particularly refrigeration. Therefore, it seems likely that no overall measure can be satisfactory and that detailed study of movements by type of commodity or groups of commodities requiring similar services is necessary.

During World War II, the index of per capita food consumption was frequently misused in attempts to measure the extent of inflation in food prices. An index of food expenditures per capita was derived from the Department of Commerce series on food expenditures and divided by the food consumption index. The resulting series was described as indicating price changes and it was used to criticize the cost of living index of the Bureau of Labor Statistics. This procedure overlooked completely the whole problem of changes in marketing services bought by consumers and in their prices. Similar to this procedure is the attempt to measure changes in domestic food consumption by de-

flating food expenditures by the retail food price series.

An index based directly on things to be measured is preferable to one derived indirectly. Furthermore, the food consumption index and the food price index are far more accurate than data on food expenditures because available statistical data are more complete in coverage and require relatively few assumptions to derive current estimates.

Problems Related to Groups of Foods

Let us turn now to the consideration of problems that involve analysis of a particular group of commodities. If we are studying the demand for vegetables, for example, we need to add farm-weight equivalents of processed items to the farm weight of the products purchased in fresh form. Or we may want to study changes in the consumption of canned and frozen vegetables as opposed to fresh vegetables, produced for commercial sale or for home use in home gardens. Sometimes, fresh equivalents are more meaningful; at other times, processed weights are better. But as vegetables produced for processing return different prices to farmers than do those sold for fresh market, we should often turn to the concept of value and its related measures. Here, we must decide whether we want to hold prices constant or use changing prices. This involves us in problems of price relationships, because the relative prices for fresh market and for processing may have changed during the period under consideration. As analysts we must resolve such problems by taking into account our assumptions as to the future course of price relationships in choosing the base period for each study.

Similarly, in work on problems of consumer demand for vegetables at the retail level, we must face up to and reach decisions on such questions as the following: Do we want to include potatoes and sweetpotatoes, dry beans and peas, melons? Is our problem concerned only with commercially produced vegetables for fresh market? Or should changes in home garden output be considered? Are we interested in differences in trend among certain groups of vegetables such as leafy, green and yellow, tomatoes, and all others? Are changes in consumption of frozen and canned vegetables af-

TABLE 2.—Selected measures of per capita consumption of dairy products, fruits, vegetables, sugars and sirups, and cereal products, 1939 and 1952, with percentage comparisons ¹

Commodity and basis for measurement	Unit	1939	1952	1952 as percentage of 1939
				Percent
A. Dairy products				
Quantity				
1. Whole-milk equivalent (fat solids basis) ----	Pound -----	813	694	85
2. Total solids content -----	Pound -----	72.5	74.6	103
3. Fat solids content -----	Pound -----	32.1	27.3	85
4. Nonfat solids content -----	Pound -----	40.4	47.3	117
5. Whole-milk equivalent (mineral and protein content). -----	Quart -----	213	249	117
6. Retail weight of products -----	Pound -----	379	413	109
Value				
7. At 1939 farm prices -----	Dollar -----	12.70	11.60	91
8. At 1952 farm prices -----	Dollar -----	35.40	33.00	93
9. At 1935-39 retail prices (major products ²) ----	Dollar -----	30.20	31.00	103
10. At 1947-49 retail prices (major products ²) ----	Dollar -----	55.60	55.40	100
11. At 1947-49 retail prices (excluding a few minor products) -----	Dollar -----	58.70	59.50	101
12. At current retail prices (preliminary) ³ -----	Dollar -----	31.30	67.70	216
B. Fruits ⁴				
Quantity				
1. Farm-weight equivalent -----	Pound -----	252	242	96
2. Primary distribution weights, farm weight of fresh plus processed. -----	Pound -----	226	196	87
3. Retail-weight equivalent -----	Pound -----	210	189	90
Value				
4. At 1935-39 farm prices -----	Dollar -----	4.55	4.35	96
5. At 1947-49 farm prices -----	Dollar -----	8.15	7.50	92
6. At 1935-39 retail prices -----	Dollar -----	12.20	12.80	105
7. At 1947-49 retail prices -----	Dollar -----	23.50	23.40	100
8. At current retail prices (preliminary) ⁵ -----	Dollar -----	11.10	25.50	230
C. Vegetables ⁶				
Quantity				
1. Farm-weight equivalent -----	Pound -----	284	289	102
2. Primary distribution weights, farm weight of fresh plus processed. -----	Pound -----	265	262	99
3. Retail-weight equivalent -----	Pound -----	247	243	98
Value				
4. At 1935-39 farm prices -----	Dollar -----	4.50	4.55	101
5. At 1947-49 farm prices -----	Dollar -----	9.85	9.90	101
6. At 1935-39 retail prices -----	Dollar -----	16.40	16.00	98
7. At 1947-49 retail prices -----	Dollar -----	36.60	36.80	101
8. At current retail prices (preliminary) ⁵ -----	Dollar -----	20.00	41.90	210

Continued on page 17

fecting farmers' receipts or the retail costs to consumers?

The last question leads us back to the problem of price relationships. Price relationships existing at retail at any time in the past will reflect the processing and marketing cost structure of that time as well as consumers' economic choices. Considerable thought must be given to institutional factors such as marketing

agreements and reactions to price controls which may no longer be in effect but which might be frozen into our analysis by our choice of price relationships. Ordinarily we study past changes in consumption to obtain a basis for estimating future changes or for judging the effects of particular factors.

Because our economy is so dynamic, analysts concerned with trends in consumption and

TABLE 2.—Selected measures of per capita consumption of dairy products, fruits, vegetables, sugars and sirups, and cereal products, 1939 and 1952, with percentage comparisons ¹—(Continued)

Commodity and basis for measurement	Unit	1939	1952	1952 as percentage of 1939
D. Sugars and sirups				<i>Percent</i>
Quantity				
1. Farm-weight equivalent -----	Pound -----	1,119	1,147	103
2. Refined sugars and sirups used in all forms---	Pound -----	113	118	104
3. Sugars and sirups, excluding duplication in reported consumption of other foods.	Pound -----	107	115	107
Value				
4. At 1935-39 retail prices of refined sugars and sirups ⁷ .	Dollar -----	6.40	5.95	93
5. At 1947-49 retail prices, including higher prices for quantities used in processed products.	Dollar -----	18.80	20.20	107
E. Cereal products				
Quantity				
1. Farm-weight, grain equivalent -----	Pound -----	273	232	85
2. Product weight -----	Pound -----	199	163	82
Value				
3. At 1935-39 retail prices ⁷ -----	Dollar -----	12.40	10.30	83
4. At 1947-49 retail prices, including higher prices for quantities used in bakery prod- ucts, etc.	Dollar -----	24.50	22.80	93

¹ Most of the value data used in this table are available only for the two years indicated.

² Major products are fluid milk and cream, cheese, condensed and evaporated milk, ice cream, and butter. (Excluding butter, values at 1935-39 prices would be \$24.20 and \$28.00 in 1939 and 1952, respectively—a 16-percent increase in 1952 over 1939; at 1947-49 prices, values of \$42.20 and \$48.70, respectively—a 15-percent increase.)

³ Retail weight of quantities consumed times estimated retail prices. (Excluding butter, value in 1939 is \$26.00; in 1952, \$60.30—232 percent of the 1939 value.)

⁴ Includes melons.

⁵ Retail weight of quantities consumed times estimated retail prices.

⁶ Excludes melons, potatoes, sweetpotatoes, and dry beans and peas.

⁷ Does not reflect increasing proportion consumed in processed foods, entailing higher costs.

marketing of food cannot afford to apply their techniques blindly. Factors other than those being examined explicitly generally do not remain the same. This is especially true in times of stress when value, price, and quantity relationships seem to burst asunder and depart radically from beautifully fitted trend lines. Note A 9 and 10 in table 2, for example, for differences which the choice of 1947-49 price relationships makes in measurement of changes in consumption of dairy products from 1939 to 1952, as opposed to the use of 1935-39 prices.

The significance of the costs of processing and marketing in the measurement of changes

in consumption is accentuated in the cases of sugar products and cereal products. The price of sugar in candy or soft drinks is so much higher than the price of sugar bought in 5-pound bags in grocery stores that consumption of sugar in various forms measured in value terms, but using constant prices, appears to have risen sharply, whereas actual poundage per capita changed very little from 1939 to 1952.

Which concept should be used for the analysis of demand for specific farm products? Farmers are interested both in the prices they receive and in the quantities they sell. But cash receipts

do not supply the whole picture. Future prospects for cash receipts will depend on such factors as the uses of the product, the prices consumers are willing to pay for food processed from the farm commodity, and the cost of the raw farm product relative to total costs. For part of the analysis of demand, values of the product in constant dollars (derived by means of weighted average prices in a carefully selected base period) may be the most desirable measure. For other aspects, we may need to operate at the retail level in order to study the effect of increased demand for marketing services on demand for the farm product. In this case, we probably should use retail value or expenditures for the commodity group, if such information were available.

Effect of Meaning of Consumption upon Statistical Results

Having reviewed some of the problems associated with several different meanings or concepts of food consumption, we may proceed to match statistical data to each. Only those meanings that involve measurement of food consumption from one time to another will be considered. For convenience, data for 1939 and 1952 will be used.

Attention is directed first to the wide variation in degree of change indicated for all foods combined, though precisely the same basic quantities of individual foods were used (table 1).

The four measures of change in total poundage per capita from 1939 to 1952 come out surprisingly close. This may be coincidental, but time series have been prepared only on the retail-weight basis. Even so, the difference between the two sets of primary-distribution-weight data is sufficient to make the user beware.

The two indexes of consumption that use fixed prices as weights, one at the farm level and the other at the retail level, yield similar results for 1939-52, and their long-time series show only slight year-to-year differences. Accordingly, it appears that, despite the conceptual difference, the index of per capita food consumption may be used in studying overall demand for food at the farm level.

The changes from 1939 to 1952 in the two sets of value figures in section C of table 1 reflect the results of several economic phenomena. One is the shift toward foods for which farmers get a larger share of the consumer's dollar as from cereal products to livestock products. Another is the difference in the relative economic position of farmers and of farm prices between 1939, a depressed year for farming, and 1952, a prosperous year. Also, prices of imported foods had risen more than prices of domestically produced foods.

The greater increase in market value of food consumed than in retail value of food may be attributed largely to the reduction in the proportion of food consumed on farms where produced, some shift from rural to urban areas, and some increase in eating away from home.

In the study of the consumption of groups of foods, such as dairy products, we would expect to have fewer complications in measuring changes from one year to another. On the contrary, we often find more difficulty because like foods may be combined on the basis of special attributes not common to all foods.

Consider the case of dairy products where the fat content, the nonfat content, and the milk solids are each important for certain purposes. Referring to section A of table 2, we note the variation between 85 and 216 percent in statistical results of measuring the change in consumption from 1939 to 1952, depending upon the basis used in combining individual dairy products. If farmers are paid for their milk on the basis of fat content, then either whole-milk equivalent on a fat-solids basis or fat content alone may be used to measure consumption. But if we are interested only in the nonfat content of milk, perhaps for nutritional analysis, we should use nonfat milk solids as the basis for combining the many dairy products (A 5, table 2).

The differences between fat and nonfat content from 1939 to 1952 are readily attributable to reduced consumption of butter and increased consumption of whole-milk and skim-milk products. These same factors affect all other measures of change too. The greater degree of change indicated on a retail-value basis than on a farm-value basis arises largely from increased sales

of fluid milk and whole milk products with relatively high marketing costs. The different results in A 9 and A 10 in table 2 indicate the necessity for care in choosing the base period for prices to be used as weights in combining foods within a commodity group. The analyst must decide which set of relationships he considers most desirable for his problem.

Comparable analyses can be made for fruits and vegetables, as indicated in table 2. The greater cost of marketing fresh produce in recent years tends to offset the cost of processing and marketing the canned, dried, and frozen products. So the trend toward increased processing does not push up the revised index of per capita food consumption nearly as much as would be expected.

In contrast, the costs to consumers of sugar and flour in processed foods such as soft drinks, confections, and bakery products are so much higher than for just sugar or flour, that great care must be taken to ascertain the meaning of consumption pertinent to the problem at hand. Relatively satisfactory data on output of products manufactured from sugar and flour are available only for years covered by the Census of Manufactures and even these are not complete. Accordingly, the use of sugar and of flour in processed forms can be only approximated, although total consumption in all forms is measured quite accurately. Purchases of foods processed from sugar and sirups and from cereal products have increased so sharply that they cannot be disregarded. So in revising the index of per capita food consumption, an adjustment was made in the combination of (1) the prices of flour and of refined sugar purchased as such and (2) estimates of prices of these commodities bought in the forms of baked goods, or as candy and soft drinks. The effects of such higher prices on the value aggregates are indicated in table 2.

Conclusions

Data in tables 1 and 2 show how widely the

estimates of the degree of change in overall consumption of food and in consumption of groups of foods can vary, depending upon how food consumption is interpreted. We may conclude that the principal difficulties in measuring changes in food consumption lie in the analysis of the problems to which the measurements are to be applied. Is it a matter of weight? or of uses of farm resources? or of payments for farm resources used? or of use of farm resources plus fixed amount of marketing services? or of farm resources plus all marketing services? Is the analyst concerned with changing prices? Or does the problem narrow down to particular characteristics or attributes of all foods combined or of particular food groups?

On the other hand, the choice of the proper measure of food consumption may depend on whether the analyst considers the problem from the viewpoint of farmers, processors, transporters, retailers, or consumers. The definition of food as an object of consumption differs significantly from the definition of food as a production item. The longer the distribution system for food, the more services are combined with the raw farm products. Some consumers might prefer fewer such services and lower prices but, in general, they buy the services because they want or need them. The rise of self-service food stores concurrently with greatly increased sales of ready-to-serve food items indicates the effect of consumers' choices among services.

One of the causes of the increased expenditure for marketing services is social and economic change, like concentration of population in urban areas, which forces consumers to pay higher transportation and handling costs. But a more important cause is that consumers want certain services with their food. Here the separation of the services supplying time, place, and form utility from the raw commodity raised on the farm becomes academic. To the housewife, they are part and parcel of the can of frozen orange juice she buys.

Economic Problems of the Horticultural Specialties

By M. Truman Fossum

An area of research in agricultural economics hitherto largely neglected was introduced with the recent publication of "Trade in Horticultural Specialties,"¹ which was issued by the Bureau of Agricultural Economics last April. The data in this statistical compendium constitute the basis for further research in this field. That the industry is of economic importance may be seen in the fact that at midcentury the value of sales and inventory of horticultural specialty goods and services in this country exceeded \$1.5 billion. The labor force of the industry was more than a quarter million persons, with a payroll of more than \$300 million. Cash receipts from horticultural specialties in 1952 surpassed those of such outstanding farm products as potatoes, apples, oranges, sugar beets and cane, wool, turkeys, and sheep and lambs. Some of the aspects of economic research in the horticultural specialties were considered at a workshop conducted last summer by the Foundation for Floriculture, in cooperation with BAE. In the accompanying paper Mr. Fossum follows up with an outline of the principal areas of economic investigation in this fertile field.

The horticultural specialties industry includes both commercial floriculture and commercial ornamental horticulture. Floriculture has to do with outdoor and greenhouse crops which are used in homes and other buildings or for personal adornment. It is not restricted to greenhouse crop production. Ornamental horticulture pertains to crops intended for replanting out of doors. This distinction between the two industries proves to be adequate except for herbaceous plants. Among these crops, perennials are generally grown in nurseries and thus are in ornamental horticulture. Herbaceous annuals grown for replanting in flowerbeds, borders, or window boxes are most often produced in the facilities of floriculture.

Biological research in floriculture and ornamental horticulture developed largely during the last 25 years.² Until recently most of it pertained to production of crops. Some attention is now being given to marketing technology research, with emphasis on problems of storage,

packaging, and processing or preparation for marketing.

It is only within the last 10 years that economic and statistical research for the horticultural specialties has been of interest to growers. So far, the State colleges and the Federal Government have not included economic research projects in floriculture and ornamental horticulture in their programs of teaching and investigation in agricultural economics. This shortcoming was not necessarily the fault of agricultural economists, for the primary interest of growers and the professional personnel that served these industries was focused on plants—their introduction, propagation, culture, and usefulness in design and arrangement.

Florists and nurserymen have lacked leadership or direction for formulating ways and means of obtaining economic facts and putting them to use effectively. Irrespective of the long recognized separation of subject matter in State colleges and the Federal Government, florists and nurserymen have become accustomed to presenting all of their problems to the biological scientists who work with their crops. But these professional workers seldom considered the place of economics in farm management and marketing research.

Despite these handicaps some progress has been made in the economic phases of this industry. Florists and nurserymen since 1945 have

¹ FOSSUM, M. TRUMAN. *TRADE IN HORTICULTURAL SPECIALTIES—A STATISTICAL COMPENDIUM, 1890-1950*. U. S. Dept. Agr. Marketing Research Rpt. 33, 116 pp., illus. 1953. (Available from the Government Printing Office, Washington, D. C. at 50 cents a copy.)

² FOSSUM, M. TRUMAN. *ECONOMIC EDUCATION AND RESEARCH FOR FLORICULTURE AND ORNAMENTAL HORTICULTURE*. Bur. Agr. Econ. 10 pp. June 1953. (Processed.)

supported the development of a fairly comprehensive body of descriptive statistics. These are available in the form of a progress report,³ and recent publications of the United States Department of Commerce⁴ and the United States Department of Agriculture.⁵ Beginnings have likewise been made in developing cooperation between biological and social scientists, which will be of increasing importance as economic problems in farm management and marketing are examined.

Economic research for florists and nurserymen first faces the limitations caused by the lack of a universal language in terms of grades and standards. This may well be the common ground on which economists and biologists can meet. The combined techniques and know-how of both groups working with the industries bear promise of the establishment and use of grades and standards.⁶ When properly constituted grades and standards are established, accepted, and used, such services as market reporting, planting intentions, and crop estimating may be extended to these industries.

Several experiment stations — California, Florida, Hawaii, Indiana, Michigan, and New York—have already undertaken preliminary projects relating to problems in the economics of horticultural specialty farm management and marketing. Current projects and plans include added efforts of the Agricultural Marketing Service of the United States Department of Agriculture and the State agricultural experiment stations of Iowa and Pennsylvania.

Attention has been limited almost entirely to horticultural specialty commodities that move through wholesale markets—essentially, cut flowers. The economic problems concerned with these crops overshadowed equally important problems that face growers of other floricultural crops, nursery stock, sod, bulbs, and

flower seed, to which practically no attention has been given.

Except for fruit stock and seeds, the commercial enterprises of these industries arose out of private estate and public park gardening. The results-at-any-cost endeavors of such horticultural pursuits resulted in trade in these commodities that gave great emphasis to services and accessories associated with goods. As a whole, little difficulty was experienced in selling annual output.

But in recent years production has increased substantially. The number and complexity of the economic problems facing the horticultural specialties industry have also increased. Owing to these developments, coupled with the absence of earlier economic research in this field, future expansion of research in the economic problems of the industry affords the prospect of productive results.

As most of the problems will need to be solved by those who manage the enterprises or organizations of the industry, this discussion is primarily focused on the economic aspects that will help management to make better decisions. Actions by the Government of course may aid in the solution of some problems, therefore mention is also made of some of the more important of these.

Problems in Business Records

The best tool of management is an adequate record system. But there is an almost universal absence of suitable, simplified records which furnish the basis for sound decisions. Workable but adequate methods for cost control and for valuing inventories are among the general problems of growers of the crops. Most of the systems so far proposed have proved so complicated as to defeat the purpose for which they were intended.

Adequate record-keeping is found mostly among wholesalers of cut flowers, greens, or foliage, and supplies for retailers and concerns that specialize in the sale of bulbs, plants, seeds, and supplies to growers. The major requirement among these establishments is for greater uniformity in the procedures employed.

Retailers of floriculture have had some guidance in bookkeeping from the clearing houses of

³ FOSSUM, M. TRUMAN. *FLORICULTURE AND ORNAMENTAL HORTICULTURAL ECONOMICS*. Chicago, Society of American Florists. 150 pp., illus. 1950.

⁴ UNITED STATES BUREAU OF THE CENSUS. *HORTICULTURAL SPECIALTIES. VOL. 5, PART 1. 1950 CENSUS OF AGRICULTURE*. 761 pp. illus. 1952.

⁵ *TRADE IN HORTICULTURAL SPECIALTIES*, op. cit.

⁶ FOSSUM, M. TRUMAN. *MARKETING RESEARCH PROBLEMS FOR THE BIOLOGICAL SCIENTISTS OF FLORICULTURE AND ORNAMENTAL HORTICULTURE*. Bur. Agr. Econ. 8 pp. September 1953. (Processed.)

their telegraph delivery organizations. The fact that retailers and growers of floriculture are in business is often incidental to their primary interest in aesthetics of design and arrangement or cultivation of certain crops. They detest records and figures and consequently neglect them even though they recognize their importance. Nevertheless, the need for improved record-keeping methods and techniques is as important for them as for retailers of ornamental horticulture, including landscapers, sales yards, horticultural maintenance or service establishments, and garden supply stores.

The need for reporting certain types of business information to Governmental agencies is a clear reason for expanding and simplifying record-keeping methods. Improved accounts and records also will make possible the preparation of meaningful industry aggregates and averages concerning prices, volume of sales, and related information with which business firms are concerned. But the main purpose of improving records is to provide management with better information for determining changes that would be profitable. Some changes concern such selling considerations as geographic and seasonal price differentials, returns from different marketing channels and relative returns from various lines handled. Other changes relate to costs of marketing and ways of achieving greater efficiency.

Problems in Marketing

Several developments or conditions in the industry have increased the importance of various marketing problems. The specialized character of production originally resulted in highly specialized channels of trade. Many growers were also retailers and this situation has continued in considerable degree to the present time. In 1949 nearly 30 percent of the retail establishments handling horticultural specialties were also producers of these crops. As many establishments were engaged in retailing as in production.

For the most part, those retail establishments which have become completely divorced from production have continued to sell only horticultural specialties, and they usually handle only a limited number of the crops covered by

the industry. Thus, the horticultural specialties industry continues to depend primarily on highly specialized retail outlets, whereas increasing proportions of the retail trade of a growing number of products are being handled by department stores and other diversified large retail outlets.

A condition pertinent to floricultural marketing is that a large proportion of the sales are in connection with funerals, illnesses, weddings, and other occasions for which the use of flowers is traditional. More than three-fourths of the retail business of the floricultural industry is accounted for by such sales. Consumer expenditures for such purchases no doubt are more directly related to custom than to disposable income or price, with the result that the demand of this group of purchasers probably is highly inelastic. It appears likely that retailers have been so preoccupied with this segment of the market that they have not attempted to develop, or to examine sufficiently, the nature of the demand of those who purchase for other purposes.

A somewhat similar situation prevails in the ornamental horticultural industry. A substantial proportion of its total sales has been made in connection with the development of land, the landscaping of buildings for both public and private purposes, soil conservation, watershed protection, flood control, wildlife preserves, and other uses for which purchases frequently are not affected by price changes. Industry has recently discovered advantages in properly planted and maintained surroundings, for reasons ranging all the way from climate control to the psychological effect on employees, customers, and the general public. Commerce recognizes the economy and safety resulting from proper plantings, for example, good sod for air fields to reduce dust and silt which is harmful to air transportation equipment.

No doubt an examination of the above uses would indicate markets in which sales would be significantly affected by price changes. Furthermore, the volume of purchases of such commodities might be related directly to the available "free income" of prospective buyers.

The pricing process itself in the horticultural specialties industry appears to be based less on costs of the raw materials or goods than on

such intangibles as artistry. Through the medium of living materials the retail trade of floriculture and ornamental horticulture is to a large extent founded on creative effort, like music, painting, sculpture, or the theater. The combination of goods, services, and art results in economic problems unlike those usually found in trade.

Closely related to price-income relationships is the propensity for important segments of the industry to change the kinds and varieties of products as the result of findings by plant breeders or plant improvers, rather than because of demonstrated consumer preferences. Little has been done to measure the importance which consumers attach to such variables as shape, size, and color of flowers and plant materials, type of retail outlets, and amount of service incorporated with the product.

A further consideration of importance to marketing is found in the competitive interrelationships among firms in the industry. Among growers a small percentage of the establishments are large, and they account for high percentages of the crop production. A smaller proportion of the retail trade is conducted by large establishments. This situation is more like many kinds of manufacturing than other kinds of agriculture. The problem here is partly one of economic size or strength among grower establishments, as their size and strength are much greater than those of the highly specialized retailers of their goods and services.

Some horticultural specialty crops are sold through wholesale channels. The wholesalers who handle this trade help finance growers and retailers who, in effect, operate as "sharecroppers" for their financing agencies, the wholesalers. This situation at times has accentuated distribution problems.

Unlike most farmers and manufacturers, some growers supplement their own wholesale sales by handling the crops of other growers. Also some retailers are practically forced into crop production in order to supply their own trade with desired quantities or qualities of specified crops. This applies especially to crops suited for the artificial or controlled conditions of greenhouse culture and certain landscape items. Again this situation has increased the

difficulty of improving the present system of distribution for the industry as a whole.

This industry has been prone to solve certain economic problems at the biological level by means of such measures as quarantines and other trade barriers. Unlike most other farm production, but more comparable to that of many manufacturers, some kinds of varietal improvement can be patented. This gives rise to particular advantages or disadvantages to given establishments. The restrictive effects on distribution lead to additional marketing problems from an industry viewpoint.

Thus it is clear that much fruitful marketing research should be developed around the problems of the horticultural specialties industry. Possibilities of increasing the number of retail outlets that attract large numbers of customers need careful appraisal, as do the demand and pricing concepts now held by many in the industry.

Problems in Transportation

Growers, wholesalers, and retailers of cut flowers, and to a limited extent of other horticultural specialty crops, are faced with an unusual combination of circumstances in moving their products to points of consumption. Many of these crops are highly perishable and must be transported rapidly under controlled conditions of temperature and humidity. Some crops are produced almost entirely in a few localities, which means that they must be transported considerable distances to reach some markets.

The character of demand for floricultural products is such that sales may fluctuate over a wide range even within the same season, and much of this fluctuation cannot be foreseen. More so than with many other agricultural products, special facilities are needed for the rapid handling of products both while awaiting shipment and after shipment has been completed. For these reasons the adequacy of transportation services is a more important consideration to many producers than is the cost of these services.

Railway express has been a major means of transportation from grower to wholesaler or retailer, and from wholesaler to retailer. Recent reductions in the schedules and services provided

by this agency, however, have created problems for growers and wholesalers. Bus lines have been used in many areas, but establishing regular service has been difficult, for many of these companies are chartered primarily to care for passenger trade.

Air express and air freight are more recent innovations. Despite its advantages for cross country or long-distance shipments, the system has decided limitations for local deliveries in wholesale quantities and to more distant points that do not have airfields.

There are also differences in the suitability of cut-flower crops for air transport. Nearly all of the crops require packaging, which results in space requirements that are great in relation to weight. Only commodities of relatively light weight and high value, such as orchids, roses, and gardenias, can be economically transported by air. Gladioli have so much bulk and weight in relation to value that air transport is still uneconomical.

Airlines are interested in research pertaining to these problems. To quote the president of the National Air Freight Forwarders Association, "Flowers will continue to constitute the most important item of air freight within this country for some time to come."

Most flowering potted plants are finished and sold for specific holidays such as Christmas, Easter, Mothers' Day, and Decoration Day. Transportation equipment is required to provide temperature protection, the same as for cut flowers. Because of their bulk and weight in relation to value they cannot be shipped in wholesale quantities economically by air. The disadvantages of express services have been partly overcome by truck hauling. But trucking presents problems of investment depreciation, licensing, labor unions, and related factors, which make it too costly for all except large establishments. Finished or unfinished "green plants" and related items may be moved in wholesale quantities by express, bus, truck, air, water, and parcel post, depending upon the circumstances.

Rail freight has been the primary means for quantity shipments of bareroot and balled and burlapped nursery stock as well as that grown in cans. But recent rate and service changes,

especially for less than carload shipments, have forced the industry to resort to trucking. The advantages of this method of shipment to date have been offset by such disadvantages as cost of investment, depreciation, seasonal use, licensing, high cost of labor, and laws which exclude nursery products from classifications for agricultural products. Nursery stock that is balled and burlapped, or in cans, presents problems of bulk and weight in relation to value that are difficult to overcome. Some items, particularly perennial herbaceous plants and newly propagated stock, have been moved in wholesale quantities by parcel post. But recent changes in limiting package weights and dimensions have created problems equal to those respecting rates and classification.

Bulbs are usually shipped while dormant. A major problem in their transportation has to do with those intended for the production of greenhouse flowers. To obtain the desired crop at the right time, bulbs for forcing are often subjected to postharvest temperature treatments. This creates special problems of refrigeration, heating, storage, and speed in transit. Transit and terminal services and facilities for such shipping were developed with railway express, in keeping with the findings of biological research. Recent reductions in schedules and services have made difficult the seasonal movement of bulb crops. Importers and shippers of bulbs are faced with similar problems, together with those of quarantine and inspection, which make trucking an alternative with decided limitations.

Owned motor vehicles are the major means of transportation at the retail level for both floriculture and ornamental horticulture. Consumer-carrying or transport, pooled deliveries, and hired vehicles are the chief alternatives for retailers. But legislation covering licensing, drivers, jumpers, and related factors, as well as the requirements of organized labor, mean prohibitive costs, delays, and inefficiencies, for even the most effective methods of routing and loading. Rail or air express of retail shipments suffers even greater limitations than those of wholesale quantities. Least perishable items—such as dormant nursery stock, bulbs, and flower seeds—can be shipped in retail quantities by parcel post.

From the foregoing discussion it may be concluded that research on selected transportation problems promises findings of considerable value to management in its determination of adjustments which should be made. The increasing costs of transportation no doubt will force a reconsideration of the question of where production should be located, with particular attention to growers who produce highly perishable items in areas far removed from major markets. Some firms might justifiably consider the purchase of their own transportation equipment, and cost studies of this practice would be relevant. In some cases, changing transportation methods also will mean changes in marketing channels, and these must be examined before decisions can be reached concerning transportation methods to be used.

Biological research no doubt will uncover improved handling methods, and economic appraisals of these may indicate other ways in which the impact of increasing transportation costs can be lessened. In addition, other subjects in the field of transportation require further examination if marketing is to be performed efficiently. Governmental agencies play an important part in transportation, including such phases as carrier and rate regulation. Studies of the impact of such regulations on both carriers and shippers may prove useful in the continuing process of modifying and amending regulations imposed by Government.

Other Economic Problems

Growers of horticultural specialty crops have many farm management problems that are similar to those of other farmers. Major differences as they apply to horticultural specialty farmers are the intensiveness of production and frequent use of controls over such climatic conditions as light, temperature, and moisture.

Production in the horticultural specialties is characterized by a considerable investment in specialized types of equipment and facilities. Growers of these crops are more restricted in alternative uses and relative mobility of their capital investment—selected land, greenhouses, cloth houses, lath houses, and other equipment—than most farmers and manufacturers. A compensating factor is that they have a wide range

of alternative activities or combinations of the various lines of horticultural specialty production and distribution, although they seldom have occasion to use them. Industry or establishment location is a major problem, particularly when shifts in transportation methods, production costs, and cultural techniques change as greatly as they have done in recent years.

Because of the intensity of production and other peculiarities already mentioned, horticultural specialty crops represent the last type of agriculture to move from urban and semiurban areas. This gives rise to special problems of legislation, regulation, taxation, and related issues. Under conditions, or in locations, more often identified with industry, commerce, and housing, producers of horticultural specialties are faced with a complexity of economic problems more urban than rural.

As with most other kinds of farm or industrial production there is a tendency for horticultural specialty crop production to be concentrated in certain localities or areas. Reasons for this vary from climate and weather to nationality, specialized labor, and nearness to market. The difference from most other kinds of agriculture and manufacturing is that the concentrations of horticultural specialty production are in metropolitan economic areas where the greatest proportion of the retail trade is conducted.

Nevertheless, conditions associated with the location of this industry are constantly changing. Greater attention in research needs to be directed to the relative importance of changes in such factors as location of markets and transportation costs, along with such stable elements as climate, in ascertaining the feasibility of changing the location of some of the units in the industry.

At the farm management level as well as in the various channels of trade these industries have been slow to examine methods by which productive efficiency could be increased. Mechanization is a very recent innovation but it is largely limited to certain kinds of nursery production and bulb and flower seed farms. Whereas most farmers, manufacturers, and businessmen in this country long ago divorced themselves

from the European practice of apprenticeships, horticultural specialty establishments still show evidence of its influence. To a large extent, horticultural specialty operators at all levels still think of cost of labor in terms of cost per man rather than relationship to output.

Adherence to historic methods and practices, along with the psychological and philosophical attitude toward labor, has resulted in general disregard for improved layout and equipment, job evaluation, and other kinds of research related to operating efficiency. The retail trade in horticultural specialties has emphasized service, and this has caused a wasteful approach to the use of labor, space, supplies, and equipment. Reduced immigration of skilled labor, high employment, and increasing wage scales, accompanied by increased production, have made the industry feel the impact of these factors, although as yet no consistent and concentrated effort has been made toward solutions. Most of the problems that need attention in this area of research are similar to those faced by other farmers and businessmen except that they are magnified as a result of the time lag which by now is most evident.

Conclusion

Many of the economic problems of the horticultural specialties industry are similar to those in other kinds of agriculture, industry, and commerce. A few are unique to the horticultural specialties. In either event economic examination of many of the problems of the industry can prove useful to both individual operators and public agencies. Need for such investigations has been expressed by the industry, allied industries, consumers, experiment stations, other research agencies, and the Congress of the United States.

The lack of research attention to the economic problems of the industry in the past accentuates the present need for greater emphasis on economic investigations concerning all phases of the industry. Much of the research would be suited to the work of individuals or agencies that operate at State or regional levels. Some of the problems would best be dealt with at the national level and others by the industries themselves. Nearly all of the investigations bear promise of being suitable for, and strengthened by, cooperation among States, the Federal Government, and organizations of the industries concerned.

Book Reviews

Readings on Agricultural Marketing. Edited by FREDERICK V. WAUGH. Assembled and published under the sponsorship of the American Farm Economic Association. The Iowa State College Press. Ames, Iowa. 456 pages. 1954. \$5.00.

THIS BOOK represents a unique approach to a readings volume. Readings, here, do not turn out to be a series of essays, articles, or chapters of a few selected authors. Rather they are a large number of brief excerpts (219 to be exact) from varied sources bound together by editorial notes that provide unity and coherence.

Contrary to another expectation, neither does the book present the core or even main points from each published or unpublished source. Instead, it is a selection of well-stated points relevant to the topics at hand. The topics are or should be familiar to agricultural marketing economists and in many instances the statements provide a virtual thesaurus of ideas pertaining to the topics, with opposing views juxtaposed to point them up.

The job of assembling the wide array of products of agricultural marketing writers deserves special commendation. High grade products are sorted in orderly, informative, constructive, and provocative fashion. They are packaged with pertinent, cogent and sometimes pungent observations. These achieve a continuity of interest which attracts the reader to consume more and more. The excerpts are a mixture of theoretical and empirical observations interspersed here and there with historical and philosophical notes which add considerable spice. But most of the condiments as well as much of the real meat of the book are found in the editor's introductory and transitional statements which frequently rival or exceed the quality of the excerpts.

Marketing efficiency is not only discussed but demonstrated as the book does a time-saving job of materials handling. It deals with definitions, descriptions, attitudes, and aims of agri-

cultural marketing. It discusses place, time, form, and ownership aspects. It devotes other neatly organized and indexed sections to the demand and supply equating function, competition, government policy toward competition, agricultural cooperation, and market development and improvement.

Main reliance is placed upon writings appearing in domestic agricultural marketing literature with few items drawn from foreign or industrial marketing sources.

The editor makes no claim of going to original sources of ideas or information. In fact, recently published material is featured throughout. Yet he delves sufficiently beneath subsequent repetition to impress the reader with how long currently sprouting ideas have been germinating.

Although the book results from Committee effort, the imprint of the editor is distinctly clear. It is another favorable reflection of his keen insight and broad perspective. It proves to be another way he helps researchers and teachers to beget and develop ideas. Few, if any, researchers will read this book without getting leads for more effective inquiry and teachers cannot fail to acquire fresh materials for old courses. This will be true even where conscientious readers have previously seen the excerpts, because they are presented in a setting that may be more effective than the original. Moreover, thoughts drawn from several generations of writers are distilled for effective comparison by a master reviewer who takes time to guide the way.

The American Farm Economic Association can be justifiably proud of its second volume of readings.

Harry C. Trelogan

MARSHALL HARRIS has brought together in one volume a description and analysis of the salient historical events surrounding the origin of the land-tenure system in the United States. As historical background, he sketches major adjustments in English common-law tenures through half a millenium—from the time that William the Conqueror foisted feudalism upon the population to the Statute of Tenures in 1660, when the back of the feudal land system was broken. The study deals primarily, however, with tenure developments during the two centuries prior to the union of the 13 original States. According to Harris, the major principles and features of our present land-tenure system were established by the end of the colonial period.

The central question that the study seeks to answer is what brought about significant changes or prevented changes in the land-tenure system. To accomplish this, both evolutionary and revolutionary adjustments are examined. The events are related to economic, social, religious, and political philosophies and theories that brought about changes in customs and laws dealing with land tenure.

The several factors that discouraged the development of feudal tenures in America are discussed. Among these were the relative abundance of cheap land, the ever-present frontier, the imprint of religion, the emerging democratic political system, the free growth of common law, isolation from the mother country, and the acceptance of the concept of equality.

The author pays special attention to the conflicting claims among the European sovereigns to the land of the New World and how the conflicts were settled. He reviews in detail the conditions under which land was transferred from sovereign control to the various types of settlement agencies, the kinds of tenures given to bona fide settlers, and the early processes in acquiring land from the Indians. The methods used in getting settlers on the land included headright and treasury-right transfers, sale, and military and special-purpose grants.

Also included in the book are sections devoted

to the development and decay of quitrents and the emergence of property taxes, the breakdown of primogeniture and entails under the impact of the basic concept of equality, the growth of the right of almost unrestricted alienation and freedom of transfer, opening the way to land speculation and concentration. The volume traces the evolution of laws, regulations, and practices regarding inheritance, and the recording of deeds and mortgages, surveying, leasing, and societal reservation covering the rights to tax, to condemn, and to police land as property.

The welfare of the colonists, the book shows, was tied closely to the land. Thus, land questions were major issues associated with the Declaration of Independence, the Articles of Confederation, and the Constitution of the United States. During colonial days there emerged a system of relatively free land tenure, the concept of family sized farms, the principle of equality in inheritance, and the practice of protecting private property by the State with minimum social controls and maximum freedom of individual action.

Only brief reference is made to developments during the 150-year period since 1800. This fact is not indicated in the title. The gap probably is greater with respect to land tenure in the central and western States, particularly for rangeland and land under irrigation. Tenure aspects of public and urban lands and water rights are not treated.

The book is a careful marshalling of historical facts and events that surrounded the development of our land system. In addition, it includes analysis and interpretation. To select from the many pages of history those parts which deal with land tenure and to interpret and evaluate them has added much to the understanding of land problems.

This understanding of the origin of the land-tenure system in the United States will aid in appraising land-reform and improvement programs in this country and abroad. Because of the current interest in land-tenure improvements throughout the world, administrators and

policymakers, as well as students, teachers, and researchers in economics (particularly land economics), sociology, government, history, and

other related disciplines, will find this book timely and useful.

Wilfred H. Pine

Aid, Trade and the Tariff. By HOWARD S. PIQUET. Thomas Y. Crowell Company, New York. 358 pages. 1953. \$5.00.

DR. PIQUET has written an objective book on a controversial subject. His primary purpose is "to estimate the extent to which temporary suspension of trade barriers would stimulate imports, to relate such increases in imports to the so-called 'dollar gap' and foreign aid, and to examine their impact upon domestic producers." The book owes its origin to a request made by the Congressional Joint Committee on the Economic Report shortly after the outbreak of hostilities in Korea.

Most of the book centers around the author's estimates of the effects of suspending tariffs and quotas for the duration of a period of national emergency such as that which began with the outbreak in Korea. The estimates assume continuation of 1951 economic conditions in the United States and in the world generally over a 3- to 5-year period. They implicitly assume the persistence of 1951 prices for each individual commodity.

Under these assumptions Dr. Piquet estimates that, at the end of 3 to 5 years, annual imports might be larger by \$1.2 to \$2.6 billion than they would have been in the absence of tariff and quota suspension. This increase would offset only a fraction of the \$4.6 billion "dollar gap" which existed in 1951, and which was covered by the same amount (\$4.6 billion) of net foreign economic and military aid funds from the United States. These estimates should be sobering both to those who believe tariff suspension would play havoc with the entire economy and those who assume that such action would put a quick and painless end to the dollar shortage. However, imports might increase by more than \$1.2 to \$2.6 billion if the tariff and quota suspension were believed to be permanent, rather than limited to the period of national emergency.

Detailed estimates of the effects of tariff and quota suspension are presented for 206 dutiable items or groups of commodities. Needless to say, these estimates are open to attack by specialists in the commodity fields concerned. Yet some such level of detail is essential if the analysis of tariff policies is to go beyond general principles.

Agricultural commodities play a surprisingly large role in Dr. Piquet's estimates. Under his assumptions, annual imports are estimated to increase by \$1,203 million to \$2,658 million if all tariffs and quotas are suspended. But 5 agricultural commodities account for 49 percent of both the minimum and maximum estimates (\$594 to \$1,303 million). Removal of *import quotas*, which apply only to certain agricultural commodities, is estimated to increase imports by \$358 million to \$833 million. Some 85 to 90 percent of this increase is estimated to come from removal of quotas on sugar, butter, and linseed oil and the "sanitary embargo" on cattle and beef. Suspension of the *tariff* on wool is estimated to increase imports by \$272 to \$544 million; suspension of all other tariffs on farm products and their immediate derivatives might increase imports by a similar amount. Altogether about two-thirds of the total increase in imports would consist of farm products or their immediate derivatives.

The maximum estimate for wool assumes continuation of the current price-support program apparently without use of subsidies to move domestic wool into consumption. In the "commodity digest" section the author states "If duties were to be suspended and the domestic price support program eliminated the increase in (wool) imports would be closer to the minimum than to the maximum estimate." The extremely inflated price of wool in 1951 (99.5

cents a pound U. S. farm basis compared with 52.3 cents in 1952) further exaggerates the importance of this commodity in Dr. Piquet's totals.

The estimated increases in imports for both wool (\$272 million to \$544 million) and sugar (\$194 million to \$387 million) would imply a drastic reduction in domestic output, including territorial output in the case of sugar. These two commodities, to which so much weight is given in these estimates, are striking illustrations of the real problems involved in a program of tariff and quota suspension. The question of which economic groups, if any, are to suffer in the interest of expanding international trade and reducing the "dollar gap" is here raised in

acute form. Dr. Piquet directs attention to suggestions that have been made that the Government assist workers and owners to transfer into other lines. A number of possible means of providing such assistance are discussed in Chapter VII.

Three-fourths of the book consists of a set of "commodity digests" on 200 or so dutiable products. Some basic information on the nature and uses of the commodity, the ratio of imports to domestic production, and the chief sources of imports are given for each commodity. This section of the book will be a valuable reference work for those interested in the specifics of our import trade in dutiable goods.

Karl Fox

International Trade Statistics. Edited by R. G. D. ALLEN and J. EDWARD ELY. John Wiley and Sons, Inc., New York. 448 pages. 1953. \$7.50.

MOST USERS of international trade statistics are in a hurry and do not take account of the concepts and institutions that underlie these data. In this book 25 American, British, Canadian, and French experts give us a comprehensive analysis of problems encountered in the compilation and use of international trade statistics. It will serve as ready reference in connection with courses in international trade and will be of help to the professional user of trade statistics.

The subject matter is arranged in three parts: Basic Characteristics of the Statistics, Important Derived Uses of the Statistics, and Statistics of Individual Countries. An appendix lists primary national publications of international trade statistics. Unfortunately, there is no similar listing of secondary publications of international agencies, although they are cited in the text.

The chapters on valuation and exchange conversion seem to be the highlights of part I. The reader learns that valuation is likely to be affected by importers' and exporters' desire to minimize duty payments or to obtain low freight rates, to get liberal foreign exchange allocations, or to retain foreign exchange credits. It may be further distorted by official valuation systems of governments drawn up with a view

toward stabilizing revenue from ad valorem tariffs. It appears to this reviewer that valuation procedures are not unlike real estate tax-assessment procedures when it comes to approximating "true value"—or deviating from it.

Consignment sales, it is explained, permit only an estimate of value at the time of exportation, but sales realization figures are needed for an analysis of a country's balance of payments. Conversion of currencies further complicates valuation, and the existence of multiple exchange rates may introduce additional difficulties.

The chapter on index numbers of volume and price in part II is an excellent presentation of "the index number problem." The writer shows concisely and clearly that different types of index numbers can coexist and reflect different methods of measuring average change. He also explains how index numbers get hazier and less meaningful the longer the period they attempt to cover.

Readers will learn of an experiment to judge the merits of the different systems of import and export statistics carried out in 17 countries between 1931 and 1933. It led to the conclusion that "the accurate matching of import records with export records relating to the same goods cannot be carried out, whether the country of

origin and the country of consumption employ the same method of assignment or different methods." But the underdeveloped nature of statistics in many countries, particularly of Asia and Africa, may make it necessary to use the statistics of trading partners with more highly developed statistics to get information regarding the trade of such countries. The statistics of trading partners are practically the only information available regarding the trade of Iron Curtain countries.

Part III of the book, *Statistics of Individual Countries*, treats in detail the United States and the countries and areas of the British Commonwealth and Empire. Continental Europe and dependencies are also adequately discussed. But the treatment of Japan, an important trading nation with highly developed statistics, seems too cursory.

In general, the book is carefully edited and cross-referenced. The editors succeeded in

securing the advantages of specialization from the large number of contributors without sacrificing necessary coordination. However, the last three chapters, which deal with the world outside the United States and the British Commonwealth, are not as well cross-referenced as the earlier chapters.

In connection with Latin America and the Near and Far East the writers mention: "Where countries export only one or a few products, data on such exports frequently are available more promptly and with reasonable accuracy, from sources other than the official trade statistics of the country." This reviewer regrets that the scope of the book was not extended to furnish specific references to the more important sources of nongovernmental trade statistics in areas where governmental trade statistics are not available or are of limited use.

Hans G. Hirsch

A Comprehensive Agricultural Program for Puerto Rico. By NATHAN KOENIG, United States Department of Agriculture in Cooperation with the Commonwealth of Puerto Rico. Washington, Govt. Print. Off., 1953. 299 pages. \$1.75 (paper bound).

IN SPITE OF ITS MANY PROBLEMS — overpopulation, underemployment, limited agricultural resources, and undernourishment — the Commonwealth of Puerto Rico has made real strides in improving its social and economic conditions. Conscious of the vital role played by agriculture in the Island's economy, the Government pooled all efforts to make an objective analysis of the agricultural situation. With the cooperation afforded by the United States Department of Agriculture it was possible to obtain the valuable help of Nathan Koenig, whose ability to channel the good will of Puerto Rican technicians has made possible the preparation of this book.

A Comprehensive Agricultural Program for Puerto Rico comprises the most serious effort attempted so far to present in one volume the basic problems confronted in the Island's agricultural economy. Furthermore, it gives to the

public the most up-to-date basic statistical information in tables and graphic presentations. In this, Mr. Koenig was able to rely on the unfailing cooperation offered by all governmental agencies, both Federal and Commonwealth.

The book analyzes in 13 chapters the most important features of Puerto Rico's economy. Basic information about the population and its characteristics occupies the first section, followed by analysis of the land situation containing some interesting features on agriculture's role in the Island's economy, land tenure and land usage, legislative policies during the new era since 1940, postwar developments, and the lack of economic balance and diversity.

The problem of soil erosion is fully discussed. The problem of the use and control of water is presented, covering such phases as irrigation, hydroelectric power, rural electrification, drainage, flood control, and marine and inland fishery

resources.

General fields for intensive agrarian policies are traced in several chapters.

Emphasis is placed on an intensive utilization of grassland resources as one of the ways to pull away from the sugarcane monoculture.

Several projects for reclamation of new lands are mentioned, especially those of the Lajas Valley development project, Tiburones and Loiza-Rio Grande drainage projects, and La Regadera and Coamo projects.

Agricultural credit is discussed because of its direct bearing on other aspects of agricultural economics and its paramount importance in any agricultural diversification program of wide scope.

Agricultural marketing is studied, from the standpoint of both the Island's overall marketing situation and marketing needs, and such important staples as milk, livestock and meats, pineapples, tobacco, and sugarcane.

Land and tax policies are cogently set forth, with special reference to the Land Law and the Land Authority of Puerto Rico.

In short, Koenig's main thesis treats of the Island's reality, of an imperative need to increase production from the local consumption point of view. To achieve this, it is his contention that all the limited resources should be put

to produce at a maximum. Among the first lines of approach he singles out the application of all known scientific techniques in land utilization and production, including the reclamation of new lands and the intensive utilization of grassland resources. To achieve this goal, adequate provision should be taken in such important fields as agricultural credit and finance and in all phases of the marketing of farm products.

No doubt Koenig has won his place among those who have labored hard to enlighten the path for Puerto Rico's progress by bringing together in one volume much needed information on the Island's agricultural situation. This reviewer was pleased to find a notably honest approach to many situations which, for a long while, have called for objective evaluations. Undoubtedly, the book provides an excellent guide for those entrusted with the agricultural development of the Commonwealth of Puerto Rico, leaving at the same time "... freedom for the exercise of initiative and the flexibility needed for determining in detail how it shall be carried out."

One last comment worth mentioning is that Koenig's contribution is highly valuable not only to the Commonwealth but also to other areas confronted with problems similar to those being faced in Puerto Rico.

P. B. Vázquez Calcerrada

Selected Recent Research Publications in Agricultural Economics Issued by the Bureau of Agricultural Economics and Cooperatively by Other Federal Agencies and the State Colleges¹

BADGER, HENRY T. RETAIL MARGINS FOR SELECTED FRESH FRUITS AND VEGETABLES IN PITTSBURGH, PA., JULY 1950 - JANUARY 1951. 41 pp., illus. Bur. Agr. Econ. September 1953. (RMA) (Processed.)

The retail margin for the 12 commodities studied averaged about 34 percent of the consumer's dollar after allowing for waste and spoilage. The margin varied considerably among commodities.

¹ Processed reports are indicated as such. All others are printed. State publications may be obtained from the issuing agencies of the respective States.

DUCOFF, LOUIS J. THE HIRED FARM WORKING FORCE OF 1952, WITH SPECIAL INFORMATION ON MIGRATORY WORKERS. 21 pp. Bur. Agr. Econ. October 1953. (Processed.)

The numbers and composition of the 1952 hired farm working force, the chief activity of the workers, time worked, and wages earned are discussed.

FOX, KARL A. THE ANALYSIS OF DEMAND FOR FARM PRODUCTS. U. S. Dept. Agr. Tech. Bull. 1081, 90 pp., illus. September 1953.

Presents supply-demand structures for a number of

farm products, in terms of simple diagrams. Methods discussed are from a modern economic and statistical point of view.

GARLOCK, F. L., JONES, L. A., BIERMAN, R. W., and SCOFIELD, W. H., under the direction of NORMAN J. WALL. THE BALANCE SHEET OF AGRICULTURE-1953. U. S. Dept. Agr. Agr. Inform. Bull. 115, 34 pp., illus. September 1953.

This annual balance sheet contains revised series for all except livestock and non-real-estate debt.

GOODSELL, WYLIE D., VERMEER, JAMES, BROWN, W. HERBERT, FOWLER, HERBERT C., HOLE, ERLING, HURD, EDGAR B., and JENKINS, ISABEL. FARM COSTS AND RETURNS, 1952 (WITH COMPARISONS) 20 TYPES OF COMMERCIAL FAMILY-OPERATED FARMS IN 12 MAJOR FARMING REGIONS. U. S. Dept. Agr. Agr. Inform. Bull. 116, 26 pp., illus. August 1953.

Farm costs were higher in 1952 than in 1951, but realized net income of farm operators was about the same in the 2 years. As usual, returns varied widely among different types of farms.

HELFINSTINE, REX, and SCHAFFNER, L. W. IRRIGATION AND DRYLAND FARMING CAN WORK TOGETHER ON THE CANNONBALL RIVER AREA. N. Dak. Agr. Expt. Sta. Bull. 385, 39 pp., illus. June 1953. (BAE cooperating)

The greatest benefit from irrigation in this area may be the stabilization of ranch income.

KRISTJANSON, BALDUR H., editor. ISSUES IN FAMILY FARM POLICY. N. Dak. Agr. Expt. Sta. Bull. 384, 23 pp. June 1953. (Great Plains Coun. Pub. 7)

Describes these basic issues, presents proposed research programs for consideration by regional land tenure committees, and suggests State activities to strengthen family farms.

MAGEE, A. C., BONNEN, C. A., MCARTHUR, W. C., and HUGHES, W. F. PRODUCTION PRACTICES FOR IRRIGATED CROPS ON THE HIGH PLAINS. Tex. Agr. Expt. Sta. Bull. 763, 39 pp., illus. June 1953. (BAE cooperating)

Considers the use of production items such as irrigation water, seed, fertilizer, insecticides, and other materials, as well as seasonal labor, custom work, and other hired services.

SCOVILLE, ORLIN J., and SMITH, KATHERINE A. PART-TIME FARMING. U. S. Dept. Agr. Farmers' Bull. 1966, 20 pp. illus. Issued Mar. 1945; revised 1953.

The bulletin undertakes to answer the questions that are asked most frequently by people who plan to take up part-time farming.

SMITH, CECIL N. OUTLETS UTILIZED BY CUMBERLAND-SHENANDOAH GROWERS IN MARKETING THE 1950-51 APPLE CROP. Va. Agr. Expt. Sta. Bull. 461, 68 pp., illus. June 1953. (RMA; Agr. Expt. Stas. of Md., Pa., Va., and W. Va., and BAE cooperating), (Northeast Regional Pub. 12).

Processors bought three-fifths of the nearly 20 million bushels of apples harvested in 1950 by some 2,300 commercial growers in 44 counties of Maryland, Pennsylvania, Virginia, and West Virginia. The remaining two-fifths went to fresh market outlets.

SMITH, CECIL N. SOME RECENT TRENDS IN THE APPALACHIAN APPLE INDUSTRY. Va. Agr. Expt. Sta. Bull. 462, 61 pp., illus. June 1953 (Northeast Regional Pub. 15) (RMA; Agr. Expt. Stas. of Md., Pa., Va., and W. Va., and BAE cooperating).

Trends in production, tree numbers, merchandising, varieties of apples, competition from other commodities, and additional factors that affect the marketing of Appalachian apples are discussed. In this area, as in the country at large, production of apples is slowly declining.

TODD, B. J., and GREENE, R. E. L. REDUCTION OF PHYSICAL INJURIES TO EARLY IRISH POTATOES DURING DIGGING AND PICKING UP. Southern Coop. Ser. Bull. 32, 31 pp., illus. March 1953. (RMA; Agr. Expt. Stas. of Ala., Fla., N. C., Va.; BAE; and BPISAE cooperating).

Use of rubberized baskets as pickup containers would substantially reduce cuts and bruises occurring in picking up potatoes. Simple modifications made in mechanical diggers and reduction in the speed of digging would keep physical injuries to a minimum.

WALKER, SCOTT H., PRESTON, HOMER J., and NELSON, GLEN T. AN ECONOMIC ANALYSIS OF BUTTER-NONFAT DRY MILK PLANTS. Idaho Agr. Expt. Sta. Research Bull. 20, 90 pp., illus. June 1953. (Agr. Expt. Stas. of Calif., Mont., Oreg., Utah, and Washington; BAE, and FCA cooperating.)

Discusses relationships in specialized butter-powder plants between scale of operations and efficiency of use of labor, equipment, and resources. Plants in Washington, Oregon, and Idaho were studied.

WINCHESTER, C. F., and HENDRICKS, WALTER A. ENERGY REQUIREMENTS OF BEEF CALVES FOR MAINTENANCE AND GROWTH. U. S. Dept. Agr. Tech. Bull. 1071, 18 pp., illus. July 1953. (Bur. Animal Indus. and BAE cooperating)

Gives data on growth rates and level of energy intake of 16 pairs of identical twin calves when one of each pair received a reduced energy allowance and the other a more liberal allowance. The energy requirement was

Energy requirement in pounds' T.D.N. = $0.0553 \times$ pounds' bodyweight $^{2/3}$ ($1 + 0.805 \times$ pounds' daily gain).

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